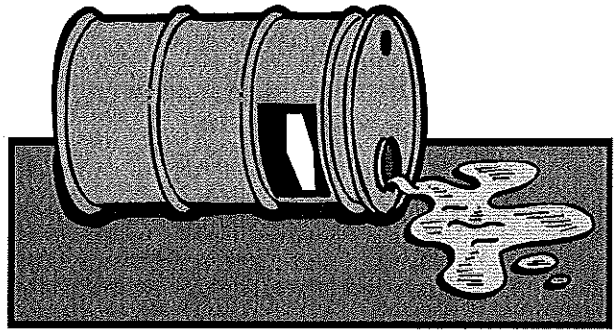
Flammable and Combustible Liquids

Guidelines for safe storage and use



FLAMMABLE AND COMBUSTIBLE LIQUIDS - 1910.106

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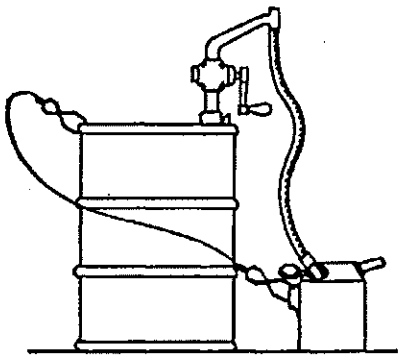
Reference:
29 CFR 1910.106, *Flammable and Combustible Liquids*

Additional Sources of Information:
National Fire Protection Association (NFPA)
Underwriters Laboratories (UL)

FLAMMABLE AND COMBUSTIBLE LIQUIDS - 1910.106

Introduction

The primary basis of this standard is the National Fire Protection Association's publication NFPA 30, *Flammable and Combustible Liquids Code*. This standard applies to the handling, storage, and use of flammable and combustible liquids with a flash point below 200°F. There are two primary hazards associated with flammable and combustible liquids: explosion and fire. In order to prevent these hazards, this standard addresses the primary concerns of: design and construction, ventilation, ignition sources, and storage.



Definitions

There are a number of definitions included in 1910.106. These definitions were derived from consensus standards, and were not uniquely developed for OSHA regulations. Some of the more important definitions are discussed below.

Aerosol shall mean a material which is dispensed from its container as a mist, spray, or foam by a propellant under pressure.

Approved shall mean approved or listed by a nationally recognized testing laboratory.

Boiling point shall mean the boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (psia). This pressure is equivalent to 760 millimeters of mercury (760 mm Hg).

At temperatures above the boiling point, the pressure of the atmosphere can no longer hold the liquid in the liquid state and bubbles begin to form. The lower the boiling point, the greater the vapor pressure at normal ambient temperatures and consequently the greater the fire risk.

Container shall mean any can, barrel, or drum.

Closed container shall mean a container so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures.

Fire area shall mean an area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hour and having all communicating openings properly protected by an assembly having a fire resistance rating of at least 1 hour.

Flash point means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid. The flash point is normally an indication of susceptibility to ignition.

The flash point is determined by heating the liquid in test equipment and measuring the temperature at which a flash will be obtained when a small flame is introduced in the vapor zone above the surface of the liquid.

A standard closed container is used to determine the closed-cup flash point and a standard open-surface dish for the open-cup flash point temperature, as specified by the American Society for Testing and Materials (ASTM). These methods are referenced in OSHA's 1910.106 standard.

Combustible liquid means any liquid having a flash point at or above 100°F (37.8°C). Combustible liquids shall be divided into two classes as follows:

Class II liquids shall include those with flash points at or above 100°F (37.8°C) and below 140°F (60°C), except any mixture having components with flash points of 200°F (93.3°C) or higher, the volume of which make up 99 percent or more of the total volume of the mixture.

Class III liquids shall include those with flash points at or above 140°F (60°C). Class III liquids are subdivided into two subclasses:

Class IIIA liquids shall include those with flash points at or above 140°F (60°C) and below 200°F (93.3°C), except any mixture having components with flash points of 200 F (93.3 C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

Class IIIB liquids shall include those with flash points at or above 200°F (93.3°C). This section does not regulate Class IIIB liquids. Where the term "Class III liquids" is used in this section, it shall mean only Class IIIA liquids.

When a combustible liquid is heated to within 30°F (16.7°C) of its flash point, it shall be handled in accordance with the requirements for the next lower class of liquids.

Flammable liquid means any liquid having a flash point below 100°F (37.8°C) or higher, the total of which make up 99 percent or more of the total volume of the mixture. Flammable liquids shall be known as Class I liquids. Class I liquids are divided into three classes as follows:

Class IA shall include liquids having flash points below 73°F (22.8°C) and having a boiling point below 100°F (37.8°C).

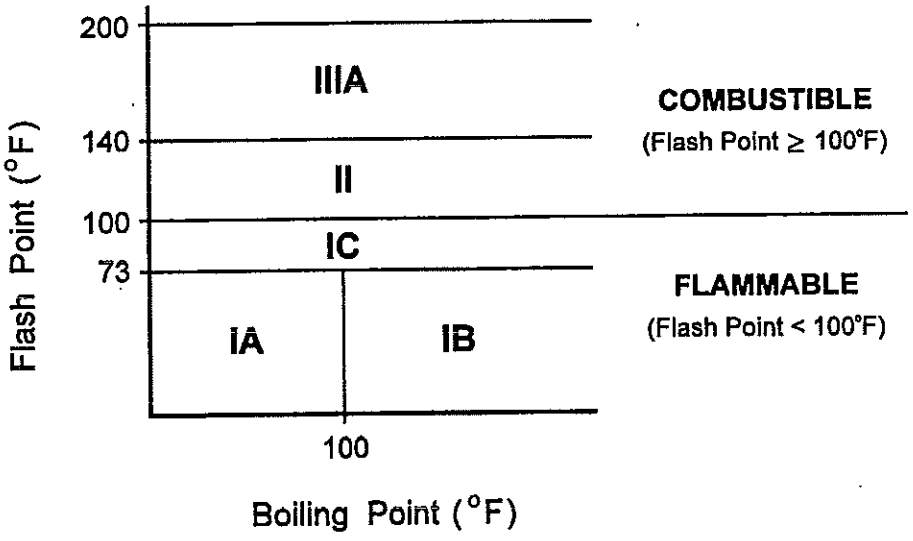
Class IB shall include liquids having flash points below 73°F (22.8°C) and having a boiling point at or above 100°F (37.8°C).

Class IC shall include liquids having flash points at or above 73°F (22.8°C) and below 100°F (37.8°C).

It should be mentioned that flash point was selected as the basis for classification of flammable and combustible liquids because it is directly related to a liquid's ability to generate vapor, i.e., its volatility. Since it is the vapor of the liquid, not the liquid itself, that burns, vapor generation becomes the primary factor in determining the fire hazard. The expression "low flash - high hazard" applies. Liquids having flash points below ambient storage temperatures generally display a rapid rate of flame spread over the surface of the liquid, since it is not necessary for the heat of the fire to expend its energy in heating the liquid to generate more vapor.

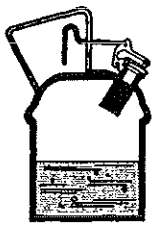
The above definitions for classification of flammable and combustible liquids are quite complex. The diagram below should aid in their understanding.

Classes of Flammable and Combustible Liquids as Defined in 29 CFR 1910.106



Portable tank shall mean a closed container having a liquid capacity over 60 U.S. gallons and not intended for fixed installation.

Safety can shall mean an approved container, of not more than 5 gallons capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.



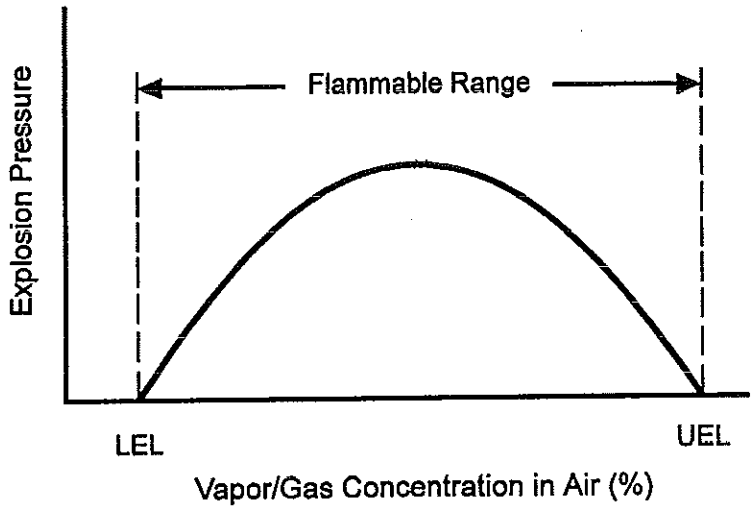
Vapor pressure shall mean the pressure, measured in pounds per square inch (absolute) exerted by a volatile liquid as determined by the *Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)*, American Society for Testing and Materials ASTM D323-68.

Vapor pressure is a measure of a liquid's propensity to evaporate. The higher the vapor pressure, the more volatile the liquid and, thus, the more readily the liquid gives off vapors.

Ventilation as specified in this section is for the prevention of fire and explosion. It is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit.

Flammable (Explosive) Limits

When vapors of a flammable or combustible liquid are mixed with air in the proper proportions in the presence of a source of ignition, rapid combustion or an explosion can occur. The proper proportion is called the *flammable range* and is also often referred to as the *explosive range*. The flammable range includes all concentrations of flammable vapor or gas in air, in which a flash will occur or a flame will travel if the mixture is ignited. There is a minimum concentration of vapor or gas in air below which propagation of flame does not occur on contact with a source of ignition. There is also a maximum proportion of vapor in air above which propagation of flame does not occur. These boundary-line mixtures of vapor with air are known as the *lower* and *upper flammable* or *explosive limits* (LEL or UEL) respectively, and they are usually expressed in terms of percentage by volume of vapor in air. See figure below.



In popular jargon, a vapor/air mixture below the flammable limit is too "lean" to burn or explode, and a mixture above the upper flammable limit is too "rich" to burn or explode. No attempt is made to differentiate between the terms *flammable* and *explosive* as applied to the lower and upper limits of flammability.

Container and Portable Tank Storage

Scope

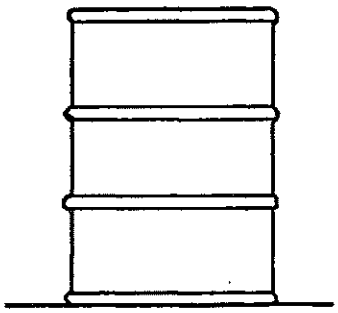
This section applies only to the storage of flammable or combustible liquids in drums or other containers (including flammable aerosols) not exceeding 60 gallons individual capacity and portable tanks of less than 660 gallon individual capacity. A portable tank is a closed container which has a liquid capacity of over 60 gallons and is not intended for fixed installations.

This section does not apply to the following:

- Storage of containers in bulk plants, service stations, refineries, chemical plants, and distilleries;
- Class I or Class II liquids in the fuel tanks of a motor vehicle, aircraft, boat, or portable or stationary engine;
- Flammable or combustible paints, oils, varnishes, and similar mixtures used for painting or maintenance when not kept for a period in excess of 30 days;
- Beverages when packed in individual containers not exceeding 1 gallon in size.

Design, Construction, and Capacity of Containers

Only approved containers and portable tanks may be used to store flammable and combustible liquids. Metal containers and portable tanks meeting the requirements of the Department of Transportation (DOT) (49 CFR 178) are deemed acceptable when containing products authorized by the DOT (49 CFR 173).



The latest version of NFPA 30, *Flammable and Combustible Liquids Code*, indicates that certain petroleum products may be safely stored within plastic containers if the terms and conditions of the following specifications are met:

(a) ANSI/ASTM D 3435-80, *Plastic Containers (Jerry Cans) for Petroleum Products.*

(b) ASTM F 852-86, *Standard for Portable Gasoline Containers for Consumer Use.*

(c) ASTM F 976-86, *Standard for Portable Kerosine Containers for Consumer Use.*

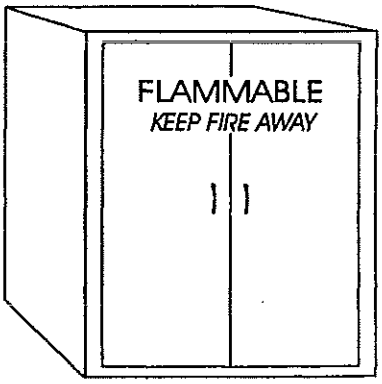
(d) ANSI/UL 1313-83, *Nonmetallic Safety Cans for Petroleum Products.*

This standard also requires portable tanks to have provision for emergency venting. Top-mounted emergency vents must be capable of limiting internal pressure under fire exposure conditions to 10 psig or 30 percent of the bursting pressure of the tank, whichever is greater. Portable tanks are also required to have at least one pressure-activated vent with a minimum capacity of 6,000 cubic feet of free air at 14.7 psia and 60°F. These vents must be set to open at not less than 5 psig. If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 300°F.

Maximum allowable sizes of various types of containers and portable tanks are specified based on the class of flammable and combustible liquid they contain.

Design, Construction and Capacity of Storage Cabinets

Not more than 60 gallons of Class I and/or Class II liquids, or not more than 120 gallons of Class III liquids may be stored in an individual cabinet.



This standard permits both metal and wooden storage cabinets. Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 325°F when subjected to a standardized 10-minute fire test. All joints and seams shall remain tight and the door shall remain securely closed during the fire test. Storage cabinets shall be conspicuously labeled, "Flammable - Keep Fire Away."

The bottom, top, door, and sides of metal cabinets shall be at least No. 18 gage sheet metal and double walled with 1½-inch air space. The door shall be provided with a three-point lock, and the door sill shall be raised at least 2 inches above the bottom of the cabinet.

Design and Construction of Inside Storage Rooms

Construction

Construction is to comply with the test specifications included in NFPA 251-1969, *Standard Methods of Fire Tests of Building Construction and Materials.*

Openings to other rooms or buildings shall be provided with non-combustible liquid-tight raised sills or ramps at least 4 inches in height, or the floor in the storage area shall be at least 4 inches below the surrounding floor. Openings shall be provided with approved self-closing fire doors. The room shall be liquid-tight where the walls join the floor. A permissible alternate to the sill or ramp is an open-grated trench inside of the room which drains to a safe location. This method may be preferred if there is an extensive need to transfer flammable liquids into and out of the room by means of hand trucks.

Rating and Capacity
Storage in inside storage rooms shall comply with the following:

STORAGE IN INSIDE ROOMS			
Fire Protection Provided[1]	**Fire Resistance**	**Maximum Floor Area (ft^2)**	**Total Allowable Quantities (gal/ft^2 floor area)**
Yes	2 hr.	500	10
No	2 hr.	500	4*
Yes	1 hr.	150	5*
No	1 hr.	150	2

* NOTE: These numbers are incorrectly shown in 29 CFR 1910.106.

Wiring
Electrical wiring and equipment located in inside storage rooms used for Class I liquids shall be approved under Subpart S, Electrical, for Class I, Division 2 Hazardous Locations; for Class II and Class III liquids, shall be approved for general use.

Ventilation
Every inside storage room shall be provided with either a gravity or a mechanical exhaust ventilation system designed to provide for a complete change of air within the room at least six times per hour. Ventilation is vital to the prevention of flammable liquid fires and explosions. It is important to ensure that air flow through the system is constant and prevents the accumulation of any flammable vapors.

Storage
In every inside storage room, there shall be maintained an aisle at least 3 feet wide. Easy movement within the room is necessary in order to reduce the potential for spilling or damaging the containers and to provide both access for fire fighting and a ready escape path for occupants of the room, should a fire occur.

Containers over 30 gallons capacity shall not be stacked one upon the other. Such containers are built to DOT specifications and are not required to withstand a drop test greater than 3 feet when full.

Dispensing shall be only by approved pump or self-closing faucet.

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1 Fire protection system shall be sprinkler, water spray, carbon dioxide, or other system.

Storage Inside Buildings

Egress

Flammable or combustible liquids, including stock for sale, shall not be stored so as to limit use of exits, stairways, or areas normally used for the safe egress of people.

Office Occupancies

Storage shall be prohibited except that which is required for maintenance and operation of equipment. Such storage shall be kept in closed metal containers stored in a storage cabinet or in safety cans or in an inside storage room not having a door that opens into that portion of the building used by the public.

General Purpose Public Warehouses

There are tables in the standard summarizing the storage requirements applicable to "General Purpose Public Warehouses." These tables refer to indoor storage of flammable and combustible liquids which are confined in containers and portable tanks. Storage of incompatible materials that create a fire exposure (e.g., oxidizers, water-reactive chemicals, certain acids and other chemicals) is not permitted.

Warehouses or Storage Buildings

The last type of inside storage covered by this paragraph addresses storage in "warehouses or storage buildings." These structures are sometimes referred to as outside storage rooms. Practically any quantity of flammable and combustible liquid can be stored in these buildings provided that they are stored in a configuration consistent with the tables in this paragraph.

Containers in piles shall be separated by pallets or dunnage where necessary to provide stability and to prevent excessive stress on container walls.

Stored material shall not be piled within 3 feet of beams or girders and shall be at least 3 feet below sprinkler deflectors or discharge orifices of water spray, or other fire protection equipment.

Aisles of at least 3 feet in width shall be maintained to access doors, windows or standpipe connections.

Storage Outside Buildings

Requirements covering "storage outside buildings" are summarized in tables in this paragraph. Associated requirements are given for storage adjacent to buildings. Also included are requirements involving controls for diversion of spills away from buildings and security measures for protection against trespassing and tampering. Certain housekeeping requirements are given which relate to control of weeds, debris and accumulation of unnecessary combustibles.

Fire Control

Suitable fire control devices, such as small hose or portable fire extinguishers, shall be available at locations where flammable or combustible liquids are stored.

At least one portable fire extinguisher having a rating of not less than 12-B units shall be located:

- outside of, but not more than 10 feet from, the door opening into any room used for storage; and

- not less than 10 feet, nor more than 25 feet, from any Class I or Class II liquid storage area located outside of a storage room but inside a building.

The reason for requiring that portable fire extinguishers be located a distance away from the storage room is that fires involving Class I and Class II flammable liquids are likely to escalate rapidly. If the fire is too close to the storage area, it may be impossible to get to it once the fire has started.

Open flames and smoking shall not be permitted in flammable or combustible liquid storage areas.

Materials which react with water shall not be stored in the same room with flammable or combustible liquids. Many flammable and combustible liquid storage areas are protected by automatic sprinkler or water spray systems and hose lines. Consequently, any storage of water-reactive material in the storage area creates an unreasonable risk.

Industrial Plants

Scope
This paragraph applies to those industrial plants where:

- the use of flammable or combustible liquids is incidental to the principal business; or

- where flammable or combustible liquids are handled or used only in unit physical operations such as mixing, drying, evaporating, filtering, distillation, and similar operations which do not involve chemical reaction.

This paragraph shall not apply to chemical plants, refineries or distilleries.

Incidental Storage or Use of Flammable or Combustible Liquids
Application
This subparagraph is applicable to those portions of an industrial plant where the use and handling of flammable or combustible liquids is only incidental to the principal business, such as paint thinner storage in an automobile assembly plant, solvents used in the construction of electronic equipment, and flammable finishing materials used in furniture manufacturing.

Containers
Flammable or combustible liquids shall be stored in tanks or closed containers.

The quantity of liquid that may be located outside of an inside storage room or storage cabinet in a building or in any one fire area of a building shall not exceed:

- 25 gallons of Class IA liquids in containers
- 120 gallons of Class IB, IC, II, or III liquids in containers
- 660 gallons of Class 1B, 1C, II, or III liquids in a single portable tank.

Handling Liquids at Point of Final Use

Flammable liquids shall be kept in covered containers when not actually in use.

Where flammable or combustible liquids are used or handled, except in closed containers, means shall be provided to dispose promptly and safely of leakage or spills.

Flammable or combustible liquids shall be drawn from or transferred into vessels, containers, or portable tanks within a building only in the following manner:

(1) Through a closed piping system,

(2) From safety cans,

(3) By means of a device drawing through the top, or

(4) From containers or portable tanks by gravity through an approved self-closing valve.

Transfer operations must be provided with adequate ventilation. Sources of ignition are not permitted in areas where flammable vapors may travel.

Transferring liquids by means of air pressure on the container or portable tanks is prohibited. This may result in an overpressure which could exceed what the container or tank could withstand. In addition, a flammable atmosphere could be created within the container or tank. This atmosphere would be particularly sensitive to ignition because of the increased pressure.

Flammable and Combustible Liquids - §1910.106(a)

(18) ***Combustible liquid*** means any liquid having a flashpoint at or above 100°F (37.8°C). Combustible liquids shall be divided into two classes as follows:

(i) *Class II liquids* shall include those with flashpoints at or above 100°F (37.8°C) and below 140°F (60°C), except any mixture having components with flashpoints of 200°F (93.3°C) or higher, the volume of which make up 99 percent or more of the total volume of the mixture.

(ii) *Class III liquids* shall include those with flashpoints at or above 140°F (60°C). Class III liquids are subdivided into two subclasses:

(a) Class IIIA liquids shall include those with flashpoints at or above 140°F (60°C) and below 200°F (93.3°C), except any mixture having components with flashpoints of 200°F (93.3°C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

(b) Class IIIB liquids shall include those with flashpoints at or above 200°F (93.3°C). This section does not cover Class IIIB liquids. Where the term "Class III liquids" is used in this section, it shall mean only Class IIIA liquids.

(iii) When a combustible liquid is heated for use to within 300°F (16.7°C) of its flashpoint, it shall be handled in accordance with the requirements for the next lower class of liquids.

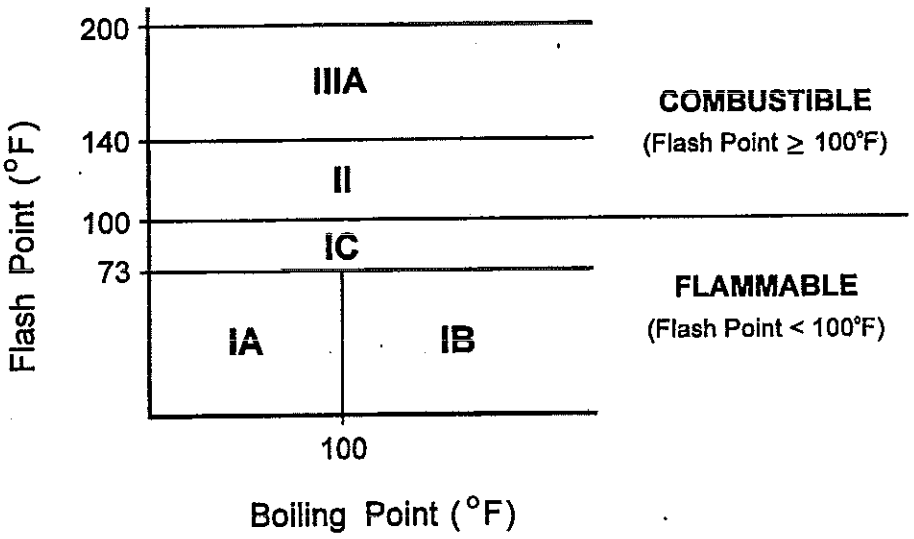
*(19) **Flammable liquid*** means any liquid having a flashpoint below 100°F (37.8°C), except any mixture having components with flashpoints of 100°F (37.8°C) or higher, the total of which make up 99 percent or more of the total volume of the mixture. Flammable liquids shall be known as Class I liquids. Class I liquids are divided into three classes as follows:

(i) Class IA shall include liquids having flashpoints below 73°F (22.8°C) and having a boiling point below 100°F (37.8°C).

(ii) Class IB shall include liquids having flashpoints below 73°F (22.8°C) and having a boiling point at or above 100°F (37.8°C).

(iii) Class IC shall include liquids having flashpoints at or above 73°F (22.8°C) and below 100°F (37.8°C).

Classes of Flammable and Combustible Liquids as Defined in 29 CFR 1910.106



FLASH POINT -- the lowest temperature at which a flammable liquid will give off enough vapors to form an ignitable mixture with the air above the surface of the liquid or within its container.

LOWER FLAMMABLE LIMIT -- the percentage of vapor in the air below which a fire can't occur because there isn't enough fuel: the mixture is said to be too lean.

UPPER FLAMMABLE LIMIT -- the percentage of vapor in the air above which there isn't enough air for a fire: the mixture is said to be too rich.

VAPOR DENSITY -- the weight of a flammable vapor compared to air. (Air = 1). Vapors with a high density are more dangerous and require better ventilation because thay tend to flow along the floor and collect in low spots.

PEL -- the Permissible Exposure Limit of the vapor according to OSHA standards, expressed in parts of vapor per million parts of contaminated air. The PEL is listed because many of these substances present inhalation as well as fire hazards.

Classes of Some Flammable Liquids

Class IA

Liquid		Flash Point (°F)	Boiling Point (°F)	Flammable Limits		Vapor Density Air = 1	PEL (ppm)
Common Name	Other Names			LEL	UEL		
1-1 Dichloroethylene	Vinylidene chloride	0	99	7.3	10.0	3.4	-
Ethylamine		<0	63	3.5	14.0	1.6	10
Ethyl Chloride	Chloroethane	-58	54	3.8	15.4	2.2	1000
Ethyl Ether	Ether	-49	95	1.9	36.0	2.6	400
Isopentane		<-60	82	1.4	7.6	2.5	-
Isopropyl Chloride	2-Chloropropane	-26	97	2.8	10.7	2.7	-
Methyl Formate		-2	90	5.0	23.0	2.1	100
Pentane		<-40	97	1.5	7.8	2.5	1000
Propylene Oxide		-35	93	2.8	37.0	2.0	100

Class IB

Liquid		Flash Point (°F)	Boiling Point (°F)	Flammable Limits		Vapor Density Air = 1	PEL (ppm)
Common Name	Other Names			LEL	UEL		
Acetone		0	134	2.6	12.8	2.0	1000
Benzene	Benzol	12	176	1.3	7.1	2.8	1
Carbon Disulfide	Carbon bisulfide	-22	115	1.3	50.0	2.6	20
1,2- Dichloroethylene	Acetylene dichloride	43	140	9.7	12.8	3.4	200
Ethyl Acetate		24	171	2.2	11.0	3.0	400
Ethyl Alcohol	Ethanol, Grain alcohol	55	173	3.3	19	1.6	1000
Ethyl Benzene		59	277	1.0	6.7	3.7	100
Gasoline		-45	100-399	1.4	7.6	3-4	-
Hexane		-7	156	1.1	7.5	3.0	500
Methyl Acetate		14	135	3.1	16	2.6	200
Methyl Alcohol	Wood alcohol, Methanol	52	147	6.7	36	1.1	200
Methyl Ethyl Ketone	MEK, 2-Butanone	21	176	1.8	10	2.5	200
Methyl Propyl Ketone	2-Pentanone	45	216	1.5	8.2	2.9	200
VM&P Naphtha	76° Naphtha	20-45	212-320	0.9	6.0	4.2	-
Octane		56	257	1.0	6.5	3.9	500
Propyl Acetate		58	215	2.0	8.0	3.5	200
Isopropyl Acetate		40	192	1.8	8.0	3.5	250
Isopropyl Alcohol	IPA, 2-Propanol	53	180	2.0	12	2.1	400
Toluene	Toluol	40	232	1.2	7.1	3.1	200
Butyl Acetate		72	260	1.7	7.6	4.0	150

Class IC

Liquid		Flash Point (°F)	Boiling Point (°F)	Flammable Limits		Vapor Density Air = 1	PEL (ppm)
Common Name	Other Names			LEL	UEL		
Isoamyl Acetate	Banana Oil	77	288	1.0	7.5	4.5	100
Amyl Alcohol	Pentanol	91	281	1.2	10	3.0	
Butyl Alcohol	Butanol	84	243	1.4	11.2	2.6	100
Methyl Isobutyl Ketone	MIBK, Hexone	73	246	1.4	7.5	3.5	100
Naphtha (Petroleum)	Mineral Spirits, Petroleum Ether	85-110	302-399	0.8	6.0	4.2	-
Propyl Alcohol	Propanol	77	208	2.1	13.5	2.1	200
Styrene (Monomer)	Vinyl Benzene	90	295	1.1	6.1	3.6	100
Turpentine		95	307-347	0.8	-	-	100
Xylene	Xylol	81-115	281-291	1.1	7.0	3.7	100

Class II

Liquid		Flash Point (°F)	Boiling Point (°F)	Flammable Limits		Vapor Density Air = 1	PEL (ppm)
Common Name	Other Names			LEL	UEL		
Isoamyl Alcohol		109	268	1.2	-	3.0	100
Cellosolve Acetate	2-Ethoxyethyl acetate	117	313	1.7	-	4.7	100
Cyclohexanone		111	313	-	-	3.4	50
Fuel Oil #1 & #2		100+	-	-	-	-	-
Fuel Oil #4		110+	-	-	-	-	-
Fuel Oil #5		130+	-	-	-	-	-
Kerosene		110-150	180-300	0.7	5.0	4.5	-
Naphtha (coal tar)		100-110	300-400	-	-	4.3	100
Naphtha (High Flash)	100° Naphtha Safety Solvent, Stoddard Solvent	100-110	300-400	0.8	6.0	>4.2	500
Methyl Cellosolve	2-Methoxyethanol	115	255	2.5	14.0	-	25

Class III

Liquid		Flash Point (°F)	Boiling Point (°F)	Flammable Limits		Vapor Density Air = 1	PEL (ppm)
Common Name	Other Names			LEL	UEL		
Aniline		158	363	1.3	-	3.2	5
Butyl Cellosolve	2-Butoxyethanol	160	340	1.1	10.6	4.1	50
Cellosolve Solvent	2-Ethoxyethanol Cellosolve Solvent	202	275	1.8	14.0	3.1	200
Cyclohexanol		162	322	-	-	2.5	50
Ethylene Glycol	Glycol	232	387	3.2	-	-	-
Furfural		140	324	2.1	19.3	3.3	5
Glycerine	Glycerol	320	554	-	-	3.2	-
Isophorone		184	419	0.8	3.8	-	25
Nitrobenzene		190	412	-	-	4.3	1

Non-Flammable Liquids*

Liquid		Boiling Point (°F)	PEL (ppm)
Common Name	**Other Names**		
Carbon Tetrachloride		171	10
Chloroform	Trichloromethane	142	50
Ethylene Dibromide	1,2-Dibromoethane	270	20
Methyl Chloroform	1,1,1-Trichloroethane	165	350
Methylene Chloride	Dichloromethane	104	500
Perchloroethylene	Tetrachloroethylene	248	100
Trichloroethylene	TCE, Trichlor	190	100

* Non-flammable under normal conditions. Unstabilized trichloroethylene can decompose violently in presence of fine aluminum powder.